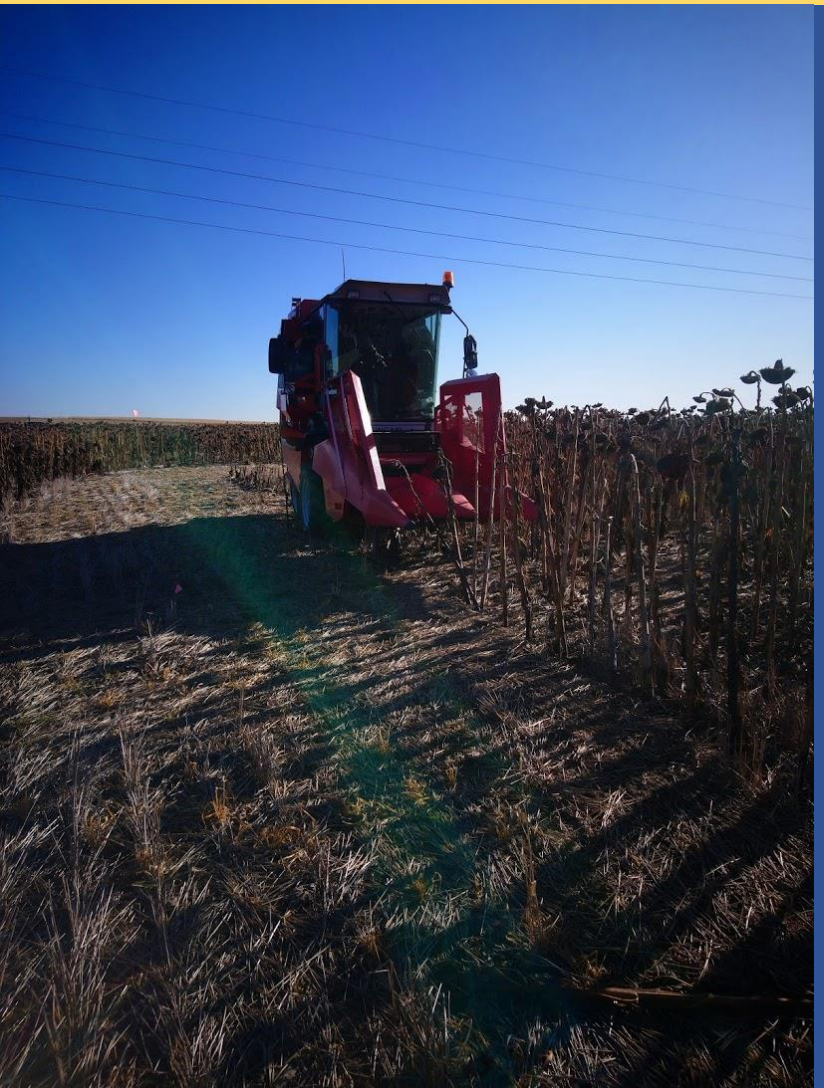
Tolerance of Sunflower, Field Pea, Lentil, and Chickpea to Fall Application of Dicamba and 2,4-D.



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Introduction

- Control of winter annual broadleaf weeds in the spring prior to planting spring broadleaf crops can be challenging
  - More difficult to control with glyphosate whether resistant or not
  - Risk of carryover injury to spring broadleaf crop when using broadleaf herbicide
  - Broadleaf weeds such as horseweed, prickly lettuce, narrowleaf hawksbeard, and mustard species can be difficult or impossible to control in-crop
  - Need for an effective and inexpensive herbicide that won’t antagonize glyphosate and won’t carry over to injure the spring-planted crop.

Introduction

- Fall herbicide application is another option
  - 2,4-D and dicamba can provide effective control of winter annual broadleaf weeds when applied in the fall
  - The 2,4-D label states that crops can be planted 30 days after application
  - Dicamba labels are not clear on when specific crops can be planted
  - You must also consider slower degradation of herbicides when the soil is cold or frozen
  - Planting spring broadleaf crops following a fall application of dicamba or 2,4-D may be off-label depending on when the herbicide is applied and when the crop is planted

Objectives

- Determine response of spring crops to fall application of 2,4-D and dicamba
  - Evaluate injury of sunflower, dry pea, lentil, and chickpea
    - Measure crop density to determine changes in stand
    - Measure crop height
    - Measure crop yield

Trial at Hettinger

- Herbicide treatments:
  - Dicamba- 4 oz/acre (0.125 lb ae/acre)
  - Dicamba- 8 oz/acre (0.25 lb ae/acre)
  - 2,4-D ester LV6- 10.9 oz/acre (0.475 lb ae/acre)
  - 2,4-D ester LV6- 21.7 oz/acre (0.95 lb ae/acre)
  - Untreated control for comparison
- All treatments (including untreated) were tank-mixed with glyphosate
- Treatments were applied on November 19, 2019
  - Late application timing due to wet fall conditions of 2019

Trial at Hettinger

- Environmental conditions at time of application:
  - Air temperature: 43 F
  - Relative humidity: 87%
  - Wind speed: 4 mph (South)
  - Soil temperature (at 6 inches): 35 F
- Application equipment/procedures:
  - Backpack research sprayer
  - Nozzles: 11001XR flat fan nozzles
  - Operating pressure: 24 PSI
  - Application volume: 10 gallons/acre
  - Ground speed: 2.8 mph

Trial at Hettinger

- Crop planting dates:
  - Dry pea and lentil were planted on May 5, 2020
  - Chickpea were planted on May 8
  - Sunflower were planted on May 28
- Injury Evaluation:
  - Dry pea and lentil:
    - Evaluated on May 27 and June 2
  - Chickpea and sunflower:
    - Evaluated on June 2 and June 26
  - Stand counts: measured on June 10
    - Two 0.5 m^2 quadrats per plot for dry pea, lentil, and chickpea
    - Sunflower: Number of plants in one row (40 feet) of each plot
  - Crop height (10 plants per plot) measured on July 27

Trial at Hettinger

- Crop harvest:
  - crops were harvested using plot combine with 5 foot header
    - Dry pea: August 7
    - Lentil: August 12
    - Chickpea: September 1
    - Sunflower: not harvested due to excessive deer and bird damage

Crop Injury at Hettinger

Treatment	Rate	Sunflower		Dry Pea		Chickpea		Lentil	
		Jun 2	June 26	May 27	Jun 2	Jun 2	June 26	May 27	Jun 2
	lb/acre	---------- percent injury ----------							
2,4-D	0.475	0	0	0	0	0	0	0 c	1 b
2,4-D	0.95	0	0	0	0	0	0	0 c	1 b
Dicamba	0.125	0	0	0	0	0	0	13 b	14 a
Dicamba	0.25	0	0	0	0	0	0	26 a	15 a
LSD (0.05)		NS	NS	NS	NS	NS	NS	2.2	1.6

Crop stand at Hettinger

Treatment	Rate	Sunflower	Dry Pea	Chickpea	Lentil
	lb/acre	---------- plants per m^2 ----------			
Untreated		3.2	63	37	230
2,4-D	0.475	3.8	62	31	229
2,4-D	0.95	4.3	61	37	199
Dicamba	0.125	3.5	66	35	210
Dicamba	0.25	3.6	60	37	176
LSD (0.05)		NS	NS	NS	NS

Crop height at Hettinger

Treatment	Rate	Sunflower	Dry Pea	Chickpea	Lentil
	lb/acre	---------- height (cm) ----------			
Untreated		13	32	28	17
2,4-D	0.475	16	32	29	18
2,4-D	0.95	15	31	31	17
Dicamba	0.125	15	30	31	17
Dicamba	0.25	15	31	32	17
LSD (0.05)		NS	NS	NS	NS

*Measured on July 27

Crop yield at Hettinger

Treatment	Rate	Sunflower	Dry Pea	Chickpea	Lentil
	lb/acre	---------- yield (lb/acre) ----------			
Untreated		-	1907	958	2315
2,4-D	0.475	-	1957	1159	2164
2,4-D	0.95	-	1404	1519	2268
Dicamba	0.125	-	1648	1306	2575
Dicamba	0.25	-	2146	1345	1953
LSD (0.05)		-	NS	NS	NS

Trial at Minot

- Herbicide treatments (same as at Hettinger):
  - Dicamba- 4 oz/acre (0.125 lb ae/acre)
  - Dicamba- 8 oz/acre (0.25 lb ae/acre)
  - 2,4-D - 16 oz/acre (0.475 lb ae/acre)
  - 2,4-D - 32 oz/acre (0.95 lb ae/acre)
  - Untreated control for comparison
- All treatments (including untreated) were tank-mixed with glyphosate

Trial at Minot

- Treatments were applied on October 8, 2019
  - Procedure similar to those at Hettinger
- Crop planting
  - Dry pea: May 12
  - Lentil: May 18
  - Sunflower: May 27
- Crop Harvest
  - Dry pea: August 5
  - Lentil: August 26
  - Sunflower: September 22

Crop Injury at Minot

Treatment	Rate	Sunflower			Dry Pea			Lentil		
		Jun 19	Jun 29	Jul 16	Jun 19	Jun 29	Jul 16	Jun 19	Jun 29	Jul 16
	lb/acre	---------- percent injury ----------								
2,4-D	0.475	0	0	0	0	0	0	2	3	0
2,4-D	0.95	0	0	0	0	0	0	12	10	0
Dicamba	0.125	0	0	0	0	0	0	12	10	0
Dicamba	0.25	0	0	0	0	0	0	14	11	0
LSD (0.05)		NS	NS	NS	NS	NS	NS	5.3	5.5	NS

Crop Stand at Minot

Treatment	Rate	Sunflower	Dry Pea	Lentil
	lb/acre	---------- plants per m row----------		
Untreated		5.5	6.8	20.6
2,4-D	0.475	5.4	7.8	19.6
2,4-D	0.95	5.2	7.0	20.6
Dicamba	0.125	6.6	7.8	20.2
Dicamba	0.25	5.9	7.3	20.8
LSD (0.05)		0.87	NS	NS

Crop Height at Minot

Treatment	Rate	Sunflower		Dry Pea		Lentil	
		Jul 7	Jul 22	Jul 7	Jul 22	Jul 7	Jul 22
	lb/acre	---------- Height (cm) ----------					
Untreated		74	148	57	63	33	38
2,4-D	0.475	70	153	60	65	30	38
2,4-D	0.95	72	148	60	66	34	35
Dicamba	0.125	74	152	58	62	32	39
Dicamba	0.25	75	158	61	62	31	37
LSD (0.05)		NS	NS	NS	NS	NS	NS

Crop Yield at Minot

Treatment	Rate	Sunflower			Dry Pea			Lentil		
		Test wt	Oil	Yield	Test wt	Protein	Yield	Test wt	Protein	Yield
	lb/acre	lb/bu	%	lb/acre	lb/bu	%	lb/acre	lb/bu	%	lb/acre
Untreated		30.5	43.3	2372	65.2	27.9	2626	60.8	23.1	2196
2,4-D	0.475	30.2	43.3	2067	65.1	28.5	2471	61.1	22.6	2402
2,4-D	0.95	29.9	42.7	1976	65.0	27.9	2769	60.3	23.9	2157
Dicamba	0.125	30.3	43.8	2067	64.8	27.9	2801	60.9	23.3	2280
Dicamba	0.25	30.4	43.3	2226	65.3	28.3	2626	60.9	23.2	2555
LSD (0.05)		NS	NS	NS	NS	NS	NS	0.38	NS	NS

Conclusions

- Similar trials were also conducted in 2018 and 2019 at both Minot and Hettinger
  - Similar results occurred for sunflower and dry pea
  - Lentil injury at Minot was greater in 2019 than in 2020
  - No reduction in stand counts or crop height at either location
  - No yield data was collected at either location
- Trial will be repeated in 2021

Conclusions

- Fall applications of dicamba and 2,4-D:
  - No injury to sunflower, dry pea, or chickpea
  - Injury to lentil from dicamba was visible only for a few weeks after planting
    - No loss in crop stand, height, or yield was found
- Results from this trial indicate that both dicamba and 2,4-D could be used to control winter annual weeds in the fall prior to planting sunflower, dry pea, or chickpea
- When planting lentil following fall application of dicamba as there is risk of crop injury
- The ability to apply these herbicides in the fall will greatly enhance the management of tough winter broadleaf such as narrowleaf hawksbeard or horseweed

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